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Clinical audit of malaria diagnosis in urban primary curative care clinics, Zimbabwe

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SUMMARY

Clinical audit was performed on the accuracy of malaria diagnosis by nursing staff within Harare City Health Department using diagnosis by doctors as the reference standard. This was found to be about 10 pc based on symptoms. The criteria for diagnosis of malaria as in ZEDAP manuals and in-house training were not being utilised. Pyrexia was not present in 40 pc of the patients. Serious illnesses were occasionally dismissed as malaria and not treated appropriately or reviewed. The most common misdiagnosis was of acute respiratory tract infections which also have clear guidelines for diagnosis.

More appropriate training methods need to be developed to improve the diagnostic capacity of nursing staff who are frontline providers of primary health care. This study shows the importance of performing an audit for process evaluation, compared to set standards and to be used for improving the quality of services.

INTRODUCTION

Malaria continues to be a serious public health problem in many areas of Zimbabwe. This is particularly the case from February to May in the wet season. In Harare City, due to the higher altitude, malaria vector mosquitoes do not breed hence there is no local transmission. All cases seen in City Health clinics are therefore assumed to be imported into Harare. Several criteria for

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diagnosis of malaria apply including history of recent travel to a malaria area. The incubation period from mosquito bite to clinical symptoms is approximately 12 days, with communicability up to one year.

The policy in City Health clinics is that patients suspected of having malaria are required to have blood slides taken first before they are given chloroquine treatment. The slides are examined for parasites by microscope in the City of Harare laboratory service and periodically sent to the National Blair Research Laboratory for quality control review.

Analysis of routinely collected health information data show that of approximately 40 000 cases a year diagnosed as clinical malaria in Harare City, only 2 to 3 pc were positive by blood slide examination for parasites[1] (see Table I). A similar picture is seen on a national level, with the Blair Laboratory reporting 4,4 to 15,6 pc positivity rates for blood slide examination for cases treated throughout the country.[2] Cases treated as malaria create a substantial burden for laboratory services and pharmaceuticals. In 1988 nearly three million tablets of chloroquine were dispensed from Government Medical Stores for Zimbabwe.[3]

In the rainy season the number of slides interpreted as positive increases, showing an increase in the number of confirmed malaria cases. However, the number of actual tallied clinical malaria cases often does not change, showing that this is not a sensitive predictor of an outbreak or seasonal rise in cases.

Table I: Diagnosis of malaria in primary care clinics – 1990.

Age group (yrs)	0 – 4	5–17	18+	Total
Clinical malaria	4 718	8 248	27 398	40 364
Positive parasitology slides	150	166	840	1 156
Percentage positive	3,18	2,01	3,06	2,86
Rank in morbidity – all causes	6th	4th	3rd	

Source: Harare City Health Department.[1]

There have been frequent attempts to improve the diagnostic skills of nursing staff for all conditions presenting at primary care level. This has taken the form of workshops such as the Zimbabwe Essential Drugs Action Programme (ZEDAP),[4] in-house training and clinic based tutorials by supervising doctors. Regular feedback on health information statistics collected at primary care level is also given to all the clinics.

Discussion with nursing staff in Harare City Health clinics reveal several potential explanations for the high proportion of cases of clinical malaria diagnosed but unconfirmed by blood slide. Patients may have already taken chloroquine bought over the counter prior to coming to the clinic, which may eliminate parasites. Blood slides taken at the wrong time when the fever was not at its height, could also be falsely negative. Another possibility is that slides were not examined correctly by laboratory staff.

Despite these explanations, it is unlikely that all the negative blood slides were false negatives. It is more probable that there is a large proportion of misdiagnosis of malaria, especially if the diagnosis is made outside the expected season of risk, or when there is no recent history of travel to endemic areas.

It was decided to perform an audit of clinical malaria diagnosis and the following study was designed to address the following objectives:

1. To evaluate use of criteria for diagnosis of malaria as taught through ZEDAP and in-house training.
2. To ascertain which diseases were being misdiagnosed as malaria so as to improve diagnosis and management of these conditions through training.

As part of the audit process, it was also hoped that the health workers involved, doctors and nurses, would evolve a better understanding of the epidemiology of malaria and to avoid over prescription of chloroquine with a view to limiting side effects, drug resistance and unnecessary expenditure.

MATERIALS AND METHODS

The study was scheduled for the dry season to minimise the number of actual malaria case presenting. The study group comprised patients who were seen as part of routine processing by primary care nurses in Harare

City Health clinics, diagnosed as having malaria on clinical grounds through history taking and examination, and prescribed chloroquine. Details of clinical findings and treatment were recorded on patient held outpatient cards. Apart from the Sister-in-Charge, nursing staff were not informed at the time that the study was in process, so they followed their usual practice and routines. Patients were identified with a malaria diagnosis when they went to the clinic dispensary counter to collect the chloroquine prescribed. The dispensary nurse was requested to redirect all cases coming to collect chloroquine to the supervising doctor's office before they were given their treatment. No other selection criteria were used. This had to be done discretely since the nurses were likely to change their diagnostic behaviour if they felt they were under scrutiny. Each patient was re-examined by the doctor who recorded relevant information in a questionaire. Data recorded by nurses on the outpatient card was recorded first, followed by the doctor's own findings and diagnoses. Blood slide results were followed up through the laboratory service.

Altogether six doctors took part at 11 clinics that they visited as part of their usual routine. Patients were recruited when the doctor was present at the clinic, which was on average for three to four hours, twice a week. None of the nurses were identified for reasons of confidentiality, since it was the process of diagnosis by nurses that was under scrutiny, and there was no intention to lay individual blame. Patients were seen by several different nurses at each clinic, since they came through the usual acute care queues over a period of six months.

RESULTS

The study took place from July 1989 to January 1990, when malaria is at low prevalence in non endemic areas. Questionaires were completed on 92 subjects from 11 clinics and analysed manually.

1. Characteristics of subjects.

The study group comprised 53 pc male and 47 pc female patients. Nine subjects were under five years old, 10 were five to 14 years, while the majority (78 pc) were adults 15 to 54 years old, with two patients 55 years and over.

Eighty three pc of the study group were recruited at clinics in high density areas and 17 pc in low density areas of Harare City. The majority (84 pc) were normally resident in urban areas, while 16 pc were visiting town from the rural areas.

2. Presenting symptoms as recorded by the nurse.

Table II shows the range of symptoms which the nurses recorded on the patient held outpatient cards.

All the patients reported more than one symptom with 27 pc complaining of five or more symptoms. The most common presenting symptoms were headache, fever and general body pains.

All 92 patients had their body temperature recorded which was done routinely for all patients attending the clinic. Of these, 54 patients had a temperature over 37,5°C while only 37 actually gave fever as a symptom. In contrast, seven patients gave fever as a symptom but did not have pyrexia recorded on their card.

3. Diagnosis made by doctors.

The 92 completed questionnaires were examined separately by three doctors involved in the audit. They

Table II: Presenting symptoms for patients diagnosed as malaria.

Symptom	No. of patients	Rank
Headache	63	1
Pyrexia	54	2
General body pain (joint pain, backache)	40	3
Chills	38	4
General body weakness (malaise, joint weakness)	22	5
Abdominal pain	19	6
Dizziness	14	7
Cough	14	8
Rigors	12	9
Vomiting	11	10
Diarrrhoea	9	
Sore throat	7	
Chest pains	7	
Nausea	3	
Loss of appetite	3	
Constipation	3	
Bubo or urethral dx	2	
Postpartum	2	
Dysuria and pv dx	1	

Miscellaneous (sweating, hiccoughs, palpitations, Herpes simplex, pain in old fracture, hypertension, hallucinations, heartburn). One for each.

analysed the data from the nurses combined with the additional data recorded in the questionnaires from the history and examination done by the clinic doctors. Each independently recorded a diagnosis of each patient's condition. There was very high consensus (98 pc) of diagnosis between the three opinions. Where there was any discension, the majority decision was taken (i.e. two out of the three agreement).

Table III: Diagnosis as made by doctors.

	Diagnosis	No. of pts (n = 92)
1.	Acute respiratory tract infections (including tonsilitis, laryngitis, and *Otitis media* in a child)	31
2.	Gastro-enteritis	10
3.	Malaria	9
4.	Urinary tract infection (including 2 with schiztosomiasis)	9
5.	Pneumonia (including 1 with meningitis)	6
6.	Generalized viral infection	5
7.	Generalized lymphadenopathy (1 with tonsilitis)	4
8.	Septic abortion, postpartum sepsis, pelvic inflammatory disease	3
9.	Hypertension	2
10.	Sexually transmitted diseases	2
11.	Other (psychosis, alcohol gastritis, measles)	3
12.	Ambivalent (? gastro-enteritis ? malaria) (? ARI ? malaria)	2 6

The diagnosis made by nurses in all these 92 cases were malaria, whereas the diagnosis made by the doctors in a third of these cases were acute respiratory tract infection. Of the nine children under five years of age diagnosed as having malaria, six actually had acute respiratory illness, one with *Otitis media*. Two of these had pneumonia, one with accompanying meningitis.

There was often little information on the patient cards to show whether patients had been adequately examined or not. On clinical examination of the study patients by the doctors, they reported signs in the questionnaires which had not been recorded by the nurses on the cards and which may have assisted in making more accurate diagnosis. In 34 pc of patients one or more of the following signs had not been recorded on the cards:

(i) Epigastric or abdominal tenderness.
(ii) Pregnancy – 30 weeks fundal height.
(iii) Urethral or vaginal discharge.
(iv) Tonsilitis.
(v) Neck stiffness in a child.
(vi) Tachypnoea and tachycardia.
(vii) *Herpes labialis* (simplex).
(viii) Lung crepitations.
(ix) Clinical anaemia with heart murmur.
(x) Measles rash with conjuctivitis.
(xi) Generalised lymphadenopathy.
(xii) Raised blood pressure.

Of the two patients who were clinically anaemic one was slide positive for malaria parasites. None of the patients were jaundiced or had splenomegaly.

4. Travel to rural areas.

The training of nurses in malaria diagnosis stresses the importance of history taking, including that of recent travel outside Harare. There was a comment recorded whether there had been any recent rural visits or not in 77 pc of the patient cards. However, 36 pc of those cards did not record where the person travelled to (three of the patients had never travelled out of Harare).

Timing of visit: With additional questioning from the doctors as part of the study, it was established that 24 pc of the study group had visited the rural areas a week or less previously, which was too early for manifestation of malaria (incubation period approximately 12 days). Forty pc of the study group had visited the rural areas between a week and two months previously and were at highest risk of presenting with actual malaria. For 30 pc their visit to the rural areas was more than two months previously; for four of these more than a year had lapsed.

Places visited: Of the 59 who had been to a rural area in the last two months, 47 pc (28/59) had been to an area known to have malaria (from ZEDAP manual). These were – Zambezi valley, Kariba, Hwange, Chiredzi, Triangle, Gokwe, Chipinge, Mutoko.

Four cases were from towns such as Gweru, Mutare, Bulawayo, where malaria transmission is very rare.

5. Treatment given by nurses.

A criterion for inclusion into the study group was a prescription for chloroquine on the patient's cards. Table IV shows additional treatments prescribed by the nurses. Sixty two pc of study patients received aspirin or paracetamol as well as chloroquine.

Table IV: Treatment given by nurse (all given chloroquine – criteria for inclusion into study).

Aspirin or paracetamol	62 pc
Multivitamins	14 pc
Antibiotics	11 pc
Adult cough mixture	5 pc
Antacids	4 pc
Rubbing cream (LMS)	1 pc
Diazepam	1 pc
Oral rehydration therapy	17 pc
Combinations:	
chloroquine + aspirin/paracetamol + multivitamins	4 pc.
chloroquine + aspirin/paracetamol + antibiotics	5 pc.
chloroquine + aspirin/paracetamol + adult cough mixture	1 pc.

6. Chloroquine use.

When asked by the doctor if they had already taken chloroquine before coming to the clinic, 78 pc of patients said no and 22 pc said yes. Only two patient cards had this information recorded on them.

Of the 20 patients who had taken chloroquine previously only four had taken a full course. Many had taken a few tablets here and there, such as one tablet bd for three days, or five tablets stat then two bd four days earlier showing the arbitrary dosages used and poor understanding of over the counter use of chloroquine.

7. Blood slide examination.

Blood slides for malaria parasite microscopy had been taken in 81 (88 pc) cases. The results were found for 67 subjects: two slides were positive and 65 were negative. The two positives had both been correctly identified and diagnosed.

Because so few positive slides were identified, quality control for the laboratory was checked by sending 20 slides previously identified as positive by the same staff, to the Blair Research Laboratory. They showed good agreement.

DISCUSSION

Clinical audit is "the process of reviewing the delivery of health care to identify deficiencies so that they may be remedied".[5] The audit cycle starts with an assessment of the quality of current care; deficiencies are identified by comparing care delivered against set standards. The final step of the cycle is to implement changes to improve the delivery of health care.

The process described in this study is of the first two stages of the cycle with recommendations on how changes can be implemented for the final stage. Ideally, the audit cycle would be repeated in the future to evaluate those changes.

Accuracy of diagnosis of malaria by nursing staff in Harare City Health Clinics was found to be 10 pc based on symptoms, using diagnosis by clinic doctors as a standard. The criteria for diagnosis as stated in ZEDAP manuals and in-house training were not being utilised adequately. Even though malaria was being studied in this instance, the same problem applies to diagnosis of acute respiratory tract illness (ARI), since a third of what was called malaria was actually ARI for which there are also clear ZEDAP guidelines.

It must be noted that although the diagnosis made by the clinic doctors was used as the standard, this was through the questionaire which specifically referred to the ZEDAP criteria. Doctors also often misdiagnose patients with headaches and fever as malaria, especially in settings where laboratory services are under utilised. Malaria is a useful diagnostic basket, with a ready treatment attached, and one that is recognized by the patients. It has been argued in endemic settings and in the rainy season, all children with fevers be treated as malaria since the treatment is relatively cheap and the aim is to prevent mortality in vulnerable groups.[6] This study specifically applies to urban settings such as Harare which has no local transmission and to the dry season when malaria is unlikely.

From the data complied by the clinic doctors, more thorough history taking and examination may have given a clearer picture. Mild illnesses which may be viral in origin and need reassurance and symtomatic treatment are being labelled malaria perhaps because it is an acceptable diagnosis. What is more worrying is that many potentially serious complaints are also being dismissed as malaria, and patients are discharged, sometimes without appointments for review, without appropriate treatment. It would be useful to know what the outcome is in many of these situations. Patients could go to another health facility if they did not improve, to a private doctor, another clinic, casualty at the hospital, or return to the same clinic of their own accord. More suffering, perhaps even death could result, because of delayed treatment, for instance with pneumonia or meningitis. Some patients who were

given several treatments would improve anyway, sometimes without any treatment.

Improved initial assessements would save time and money, as well as boosting confidence in clinic staff. Nurses should also be encouraged to review patients the following day when there is uncertainty about the diagnosis.

The nurses had their own explanations for negative blood slides on apparent malaria cases. This study showed that the majority of patients had not in fact taken chloroquine before attending the clinic. Taking slides at the height of the fever is often not possible and depends on when the patient presents at the clinic. The study also showed that laboratory staff did pick up positive slides accurately and routine quality control mechanisms with the Blair Research Laboratory were in place and worked well. The present system of blood slides for all those being treated with chloroquine is an essential instrument for monitoring quality of diagnosis. Patient knowledge about self medication of chloroquine was shown to be inadequate and indicates a priority for further research.

There is much debate over whether all fevers should be treated as malaria until proven otherwise.[3,6,7,8] Health workers may get confused by these arguments if presented as part of teaching, unless they examine the epidemiology specific to their context. The arguments apply mainly to children who are more vulnerable, especially in high malaria risk areas, and mainly in the rainy season. Only 21 pc of subjects in this study were under 15 years of age; the majority lived predominantly in urban areas. In fact 40 pc of the patients were not pyrexial. A variety of symptoms were elicited and there was often no obvious logic to the diagnosis. Headaches were the most commonly presenting problem and it seemed that chloroquine was often being used as an analgesic; often in conjuction with another analgesic.

In less resourced economies, well trained nurses are the best health workers to provide primary care diagnosis. This may even be true in developed and industrialised country settings. Their primary training does not often equip them for this however, and they deserve more support in gaining the necessary skills. The role of doctors as secondary and tertiary care providers, is also to be good trainers. Often doctors reproduce their own didatic training and give lectures on "disease packages".

At a feedback session on this study to clinic staff, nurses and doctors, there was much discussion about the best methods of teaching for primary care level. It was agreed that lectures and diagnosis centred teaching were inappropriate. Teaching has to start with symptoms and work from that to possible diagnosis and treatment. For example, instead of lecturing on urinary tract infections, bacteriology and treatment sensitivities, the teacher looks at pyrexia or headache and looks at common causes of each, and how to distinguish between them, expanding to more detail as the trainees become more confident.

The illnesses which have been misdiagnosed as malaria are listed in this study for use in future training.

History and examination have to be as vital parts of the process of decision making. For instance with malaria, more emphasis is needed on recording on the cards history of recent rural visits, seasonality, place visited, whether chloroquine has been taken already and how much. Distinction between mild and severe illness also needs more emphasis. One to one teaching with the nurse and patient was thought to be better than teaching in groups. Above all, nurses need more confidence in their powers of decision making and to be able to review patients the next day, rather than use a compulsion to "clear the queue" with "conveyor belt" medicine.

Harare City Health Department has been at the forefront in using health information systems for monitoring diagnostic trends and improvement in skills as a result of evaluation, feedback and teaching.[9] The statistics produced by the clinics on malaria, both clinical and confirmed, are used to monitor performance and discussed at team meetings. If there is no change in the balance of confirmed to clinical cases of malaria the reasons need further investigation. The audit exercise demonstrated the value of the health information system and team meetings in pinpointing problems and identifying potential solutions.

Clinical audit is often threatening to staff, because it appears critical of them and their practices, at a time when they feel overworked and undervalued. It is important that the aims of improving health care delivery be transparent. Ultimately the process is meant to be supportive of them in doing their work better and to decide how trainers can meet their needs more appropriately. Feedback sessions can encourage participation by the nurses themselves and interventions designed with their involvement. Future audit cycles may be undertaken by the nurses themselves, including evaluation of their trainers.

Conclusions: Health workers need to be stricter about diagnosis of malaria, using the criteria from the ZEDAP modules for guidance. Doctors supervising medical care at primary care clinics can be more actively involved in teaching other health workers with the participation of the Sisters-in-Charge. Clinical audit done periodically is a good way of demonstrating ways in which services can be improved and to give guidance on areas that are problematic to the nurses. Appreciating the importance of this is part of constructive self evaluation on the part of all health workers.

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